1   1.   A method for implementing bump mapping, comprising the steps of:

2   generating a table of color values referenced by orientation-dependent color

3   variables;

4   estimating angle coordinates for a pixel in a polygon;

5   modifying the estimated angle coordinates, using a perturbation source

6   converting the modified angle coordinates to one or more color variable; and

7   assigning the pixel a color value according to the one or more color variables.

2.   The method of claim 1, wherein modifying the estimated angle coordinates includes:

      generating angle perturbations; and

3   adding the angle perturbations to the angle coordinates.

3.   The method of claim 2, wherein generating angle perturbations comprises:

2   estimating a bump variable for the pixel; and

3   converting the bump variable to angle perturbations.

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1   4.   The method of claim 3, wherein converting the perturbation variable comprises retrieving

2   angle perturbations from a bump map location referenced by the perturbation variable.

1 5. The method of claim 1, wherein estimating angle coordinates comprises:

2 determining angle coordinates for normal vector orientations at vertices of the

3 polygon;

4 interpolating angle coordinates for the pixel from the determined angle

5 coordinates.

1 6. The method of claim 3, wherein estimating the perturbation variable comprises:

  determining perturbation variables for vertices of the polygon;

  interpolating perturbation variables for the pixel from the determined vertex

  perturbation variables.

7. A graphics system comprising:

2 a geometry engine to associate vector orientation data with vertices of one or more

3 polygons representing an object in an image;

4 a color map including color values for a sample of vector orientations, each color

5 value being referenced by one or more orientation dependent color variables;

6 a perturbation source to provide orientation perturbations; and

7 a rendering engine to convert vertex data for each polygon to angle and

8 perturbation coordinates for each pixel in the polygon, generate one or more perturbed

9   color variables using the angle and perturbation coordinates, and assign a color value to

10   each pixel according to its one or more color variables.

1   8.   The graphics system of claim 7, wherein the orientation-dependent color variables are

2   linearly related to angle coordinates that specify the sampled vector orientations.

1   9.   The graphics system of claim 7, wherein the perturbation source is a bump map

2   including angle perturbations referenced by the perturbation coordinates.

10.   The graphics system of claim 9, wherein the rendering engine includes a generator that

combines the angle coordinates and angle perturbations into perturbed color coordinates.

11.   The graphics system of claim 7, wherein the perturbation source is an algorithm for

associating perturbations with polygon locations according to a property of the image.

1   12.   A machine readable medium on which are stored instructions that are executable by a

2   system to implement a method for assigning a color value to an image pixel, the method

3   comprising:

4   generating color values for a sample of normal vector orientations, each color

5   value being associated with one or more scaled angle coordinates representing a

6   corresponding normal vector orientation;

7   estimating one or more angle coordinates for the pixel;

8   perturbing the one or more angle coordinates to provide modified angle

9   coordinates; and

10   retrieving a color value for the pixel according to the perturbed angle variables.

1   13. The machine readable medium of claim 12, wherein perturbing comprises:

2   generating angle perturbations for the pixel; and

3   combining the angle perturbations with the angle coordinates to form modified

4   angle coordinates.

1   14. The machine readable storage medium of claim 12, wherein estimating comprises:

2   interpolating angle coordinates for the pixel from angle coordinates for the

3   polygon vertices; and

4   converting the interpolated angle coordinates to scaled angle coordinates.

1   15. A graphics system comprising:

2   means for associating vector orientation data with vertices of one or more

3   polygons representing an object in an image;

4   means for indicating color values for a sample of vector orientations, each color

5   value being referenced by one or more orientation dependent color variables;

6   means for providing orientation perturbations; and

7   means for converting vertex data for each polygon to angle and perturbation

8   coordinates for each pixel in the polygon; and

9   means for combining angle and perturbation coordinates to provide a color value

10   for each pixel through perturbed color variable.

1   16.   The graphics system of claim 15, wherein the providing means is a bump map including

2   angle perturbations referenced by the perturbation coordinates.

1   17.   The graphics system of claim 16, wherein the combining means includes a generator that

2   combines the angle coordinates and angle perturbations into perturbed color coordinates.

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